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Incidence and Characterization of Stent Dissections in Women Versus Men: A Report from the Massachusetts General Hospital Optical Coherence Tomography Registry

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Background: We hypothesized that women are more prone to develop coronary dissections during PCI due to potential balloon over-sizing or gender specific plaque or vascular characteristics. To date, such a difference in edge dissection has not been systematically studied.
Methods: The MGH OCT Registry is an international registry of patients undergoing PCI. We identified 206 patients (159 men, 47 women) with stable angina or acute coronary syndrome with adequate OCT images for gender specific comparison in areas of non-overlapping stents. Presence of proximal/distal edge dissections, characteristics of dissections, underlying plaque composition at stent borders and luminal diameters were assessed and compared. A multivariate logistic regression model was applied to determine if female gender was independently predictive of coronary dissection after adjusting for clinical and OCT characteristics.
Results: Women had smaller mean reference vessel diameter (2.89 mm vs 3.07 mm, p=0.04) when compared to men. No gender difference was observed in age, clinical characteristics, presentation, stents per patient or plaque characteristics. Incidence and characteristics of edge dissections were different in women compared to men (Table1). These data showed that female gender (OR: 2.3, p=0.02) was an independent predictor of coronary dissection. Hypertension (OR: 2.1, p=0.03), plaque calcification at distal edge (OR: 4.6 p=0.02), lipid rich plaque at proximal edge (OR: 3.1 p<0.01) and lipid rich plaque at distal edge (OR: 3.4, p<0.01) were independently associated with the development of stent edge dissection.

Characteristics	Female (N=47)	Male (N= 159)	p-value
Any Dissection	24 (49%)	50 (29.9%)	0.02
Distal Dissection	9 (18.4%)	24 (14.4%)	0.5
Prox.Dissection	15 (30.6%)	26 (15.6%)	0.02
Prox. Flap Length	0.27 ± 0.54 mm	0.09 ± 0.26 mm	<0.01
Prox. Dissection Length	0.53 ± 0.98 mm	0.17 ± 0.44 mm	<0.01
Ratio of Stent/ Prox. Ref. Diameter> 1.2	4 (8.2%)	11 (6.6%)	0.7

Conclusions: OCT confirms that women have approximately a two-fold increased risk of developing coronary edge dissections as compared to men. The unique characteristics of gender associated dissections (proximal edge, flap length) warrant further investigation into gender specific device-vessel wall interactions.

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Early and late stent thrombosis: different clinical entities? IVUS findings

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Background: Stent thrombosis (ST) is a rare but devastating adverse event. The Academic Research Consortium proposed a standard classification of the ST based on the elapsed time since stent implantation: early ST (EST) 0-30 days, late ST (LST) >30 days, and very late ST >12 months. The multicenter Spanish Registry ESTROFA suggested that the patients with EST and LST presented a different clinical profile, which may correlate with a different physiopathology mechanism. The aim of this study is to describe the differences between EST and LST analysing the clinical characteristics, therapeutic management and intravascular ultrasound (IVUS) findings.
Methods: Patients with demonstrated ST presented in a single centre were collected. Demographic, procedural variables and treatment was recorded. ST were divided in two groups: EST and LST (>30 days).Statistics were performed with SPSS 14.0.
Results: 45 ST were detected:23 EST(11 of them acute ST) and 22LTS(7 very LST).16 were bare metal ST and 29 were drug-eluting ST. Patients with EST were elder(68,5±11,7 vs 59,8±12,6) and had more diabetes(63,6%vs34,8%). Multivessel disease was more frequent in the group of LST. The mortality rate was higher in the group of EST (30% against 4,5% for LST).The vessel most frequently affected was the LAD for ETS (43,5%) and the RCA for LTS (54,5%). The stent overlap was more frequent in the group of LST and the maximal pressure of delivery was higher in the group of EST. IVUS was performed in 19 cases. The most notable IVUS finding in the group of LST was the under-expansion of the stent(60%) with a significant intrastent proliferation in20%of cases. In the group of EST,a dissection at the edge of the stent was more frequent, with significant under-expansion and uncovered culprit lesion as secondary findings.The LTS was treated with a new stent in 50% of cases. In the EST the most frequent management was the thrombectomy followed by postdilatation.
Conclusions: The physiopathologic mechanism of the ETS and LST seems to be different. A specific treatment for each entity could be necessary. The IVUS is an invaluable tool in the matter of ST, providing precise information of the mechanism of ST and guiding the best therapeutic choice.

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Different Optical Coherence Tomography Neointimal Tissue Appearance Of Drug-Eluting Stent Restenosis After Bifurcation Stenting

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Background: Higher incidence of drug-eluting stent (DES) restenosis after bifurcation stenting has been suggested. Delayed healing is another problematic issue associated with bifurcation stenting. We assessed restenotic tissue characteristics after DES deployment at bifurcation using optical coherence tomography (OCT).
Methods: One hundred and fourteen angiographically documented in-stent restenotic lesions of five types of first- and second-generation DES (sirolimus-DES: 50%, paclitaxel-DES: 24%, zotarolimus-DES: 3%, everolimus-DES: 20%, biolimus-DES 3%) in 90 patients were included. OCT appearance of restenotic tissue was qualitatively assessed. Restenotic tissue luminal morphology, such as eccentric, concentric and protruded, was also assessed. Morphometric analysis such as measurement of minimal lumen area (MLA), stent area at MLA, neointimal hyperplasia (NIH) at MLA were performed. All variables were compared between restenotic lesions at bifurcation (BIF) vs. those at non-bifurcation (non-BIF).
Results: Among 34 bifurcation lesions (30%), 32 lesions (94%) were related with left main trunk bifurcation. Restenosis occurred at 730±696 days after initial deployment. Patient and lesion characteristics were similar except more female (38 % vs.16 %, p=0.015) and chronic kidney disease on hemodialysis (35 % vs. 14%, p=0.02), and higher incidence of focal stenosis (94% vs. 49%, p<0.001) in BIF vs. non-BIF. OCT tissue appearance, such as homogeneous (64% vs. 76%), attenuated (20% vs. 24%) and heterogeneous (16% vs. 0%) were differently distributed in BIF vs. non-BIF, particularly heterogeneous type was exclusively observed in non-BIF (p=0.04). Protruded tissue morphology tended to be more frequent in BIF vs. non-BIF (12% vs. 1%, p=0.06). Although MLA (2.3±1.2cm 2 vs. 1.6±0.8cm2, p=0.003) and stent area at MLA(7.1±2.5cm 2 vs. 6.1±1.8cm2, p=0.04) were larger, NIH at MLA (4.8±2.4cm 2 vs. 4.5±1.7cm2, p=0.4) were similar in BIF vs. non-BIF.
Conclusions: Different restenotic tissue characteristics were identified by OCT at bifurcation after DES deployment. This may depict a peculiar healing mechanism correlated with DES deployed at bifurcation.

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Predictors of In Stent Restenosis by Optical Coherence Tomography Derived Tissue Characterization In The Novel In Stent Neointimal Hyperplasia Model Of Familial Hypercholesterolemic Swine

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Background: Several publications have shown the potential for in vivo neointimal characterization using OCT-based light intensity backscattering. Several neointimal patterns have been described and correlated with histopathology. Nevertheless, the clinical significance of these findings is unclear. In this study, we aimed to seek for predictors of in-stent restenosis (ISR) based on OCT tissue characterization analysis in a novel peripheral artery model of familial hypercholesterolemic swine (FHS).
Methods: A total of 15 arterial segments of 8 FHS were enrolled. At baseline balloon injury followed by self-expandable stent implantation was performed. Two weeks after, each site underwent OCT with tissue characterization followed by POBA. All animals were then followed for additional 28 days. Morphometric OCT analysis was performed before POBA and at follow up. At last follow up, stent segments were labeled as ISR (>75%) according to percent area of stenosis (%AS) by OCT. Tissue characterization by OCT included neointimal structure and light backscatter analysis following previously published definitions. Each stent was divided into 5 segments along the longitudinal axis and matched with corresponding cross sections at follow up.
Results: A total of 75 stent segments were analyzed in which ISR occurred in 18.7%. Mean %AS was 21.7±15% before treatment and 56.6±22% at termination (p<0.01). Sections presenting with ISR, had higher %AS (34.1 vs. 12.3%;p<0.01), occurrence of heterogeneous neointima (64.3% vs. 19.7%; p<0.01) and low tissue backscattering (42.8% vs. 26.7%; p=0.01) at 14 days. In the multivariate analysis the presence of a heterogenous neointima (OR:5.9 [1.2-28.2], p<0.01) and low tissue backscattering (OR:2.9 [1.1-7.8]; p<0.01) were the only independent predictors of ISR at 28 days, regardless of baseline %AS (OR:53.6 [0.1-42797];p=0.24).
Conclusions: The presence of heterogeneous neointima and low light tissue backscattering appears to predict the risk of restenosis by 6 and 3 fold respectively. These findings could assist in the decision making process and guide the selection of the most appropriate therapeutic strategy for ISR.